

Continuous Living Covers: Annual and Perennial Systems

Donald Wyse
Center for Integrated Natural
Resources and Agricultural
Management,
University of Minnesota

Winter Annual Crops/Covers Harvested for Seed

Pennycress

Camelina

Winter Barley



Oat for fall cover
Late Fall


A photograph of a large field of groundhog radish cover crops in late fall. The plants are a vibrant green color and appear to be growing in rows. To the left of the main field, there is a strip of dark, tilled soil. In the background, a flat landscape extends to a distant horizon under a pale, overcast sky. Some distant structures and utility poles are visible on the horizon line.

Groundhog radish for fall cover
Late Fall



Pennycress (11 kg/ha)
cover: none

C 11 11

A photograph of a field with various green plants and a path of bare soil. The foreground is filled with dense, low-growing green vegetation. A narrow, straight path of bare, brownish soil runs horizontally across the middle of the image. In the background, there are more rows of green plants, and further back, a line of trees and a clear sky are visible.

No Pennycress
cover: none
6-14-11

Weed suppression under Pennycress
canopy





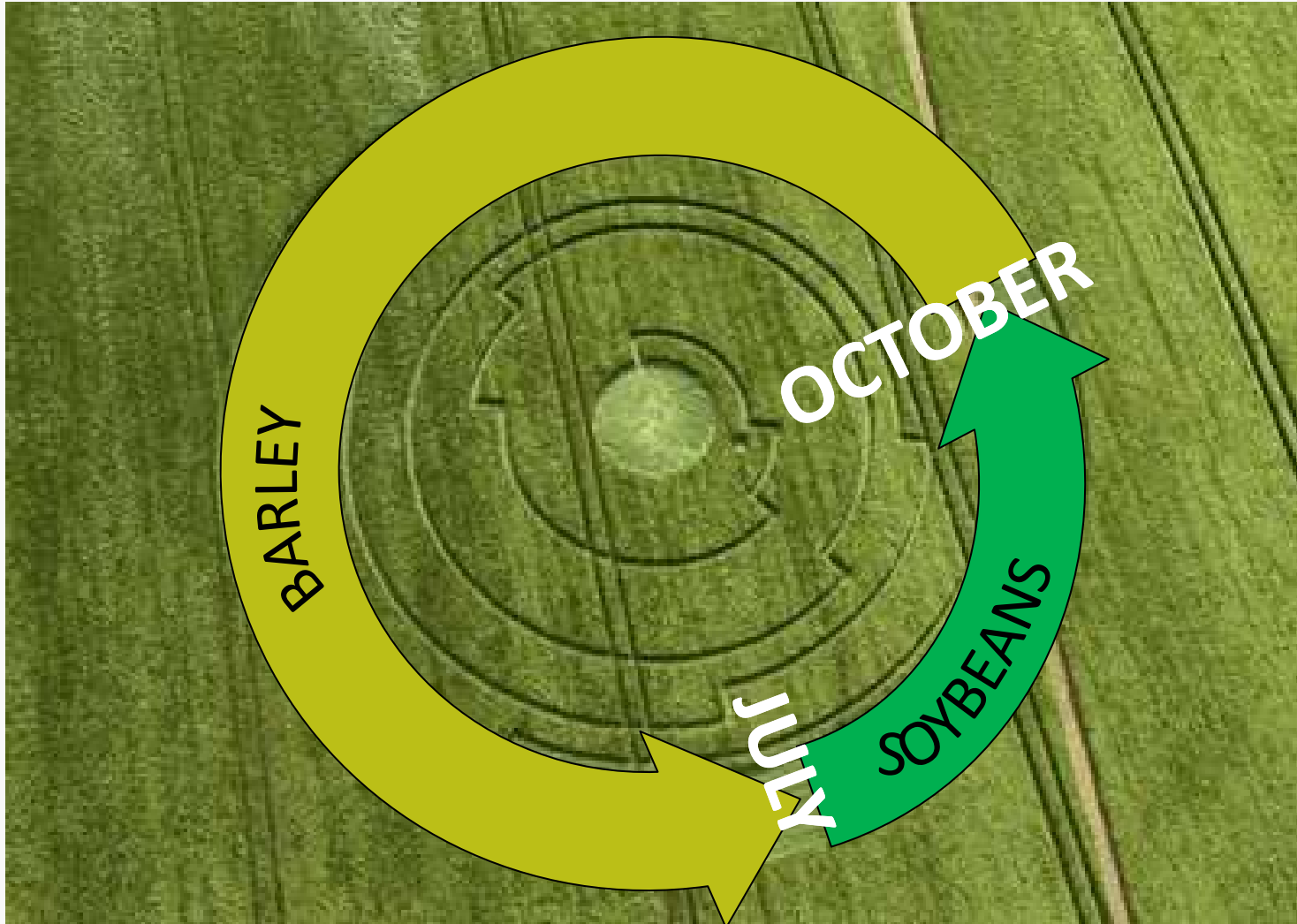
Soybean planted into Pennycress
stubble 7-18-11



Pennycress Rate: 11 kg/ha
10-23-11

Producer/Industry Benefits

Crop Diversity, Spread Out Field Activities, **Double Cropping**, Earlier Harvest



Opportunities

Ecosystem Services

Carbon Sequestration, Nutrient Cycling, Reduced Erosion



Opportunities



Winter Barley

Continuous Perennial Covers

Kura Clover

Bluegrass

Kura clover



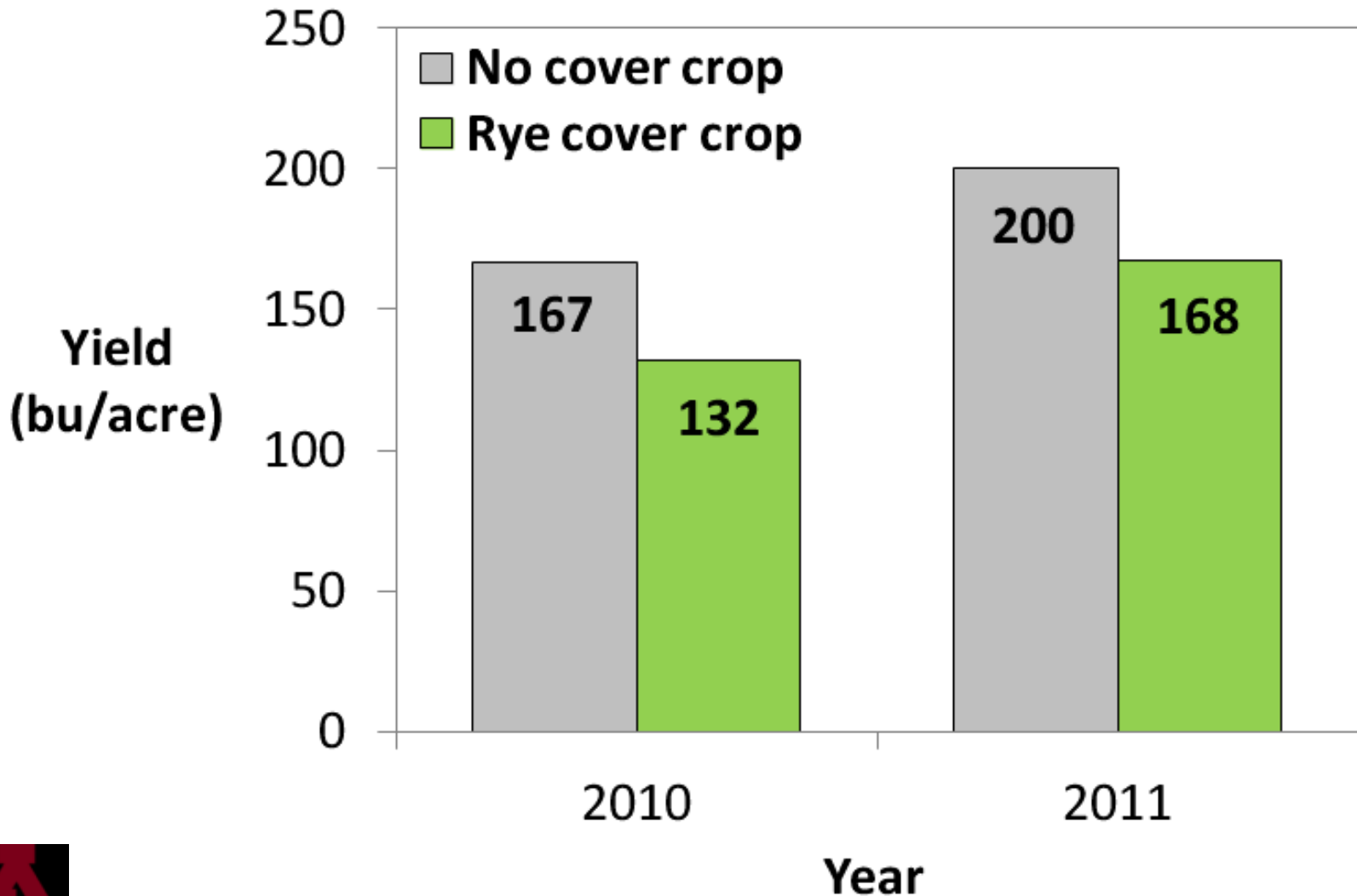
Breeding Main Crops for Cover Crop Systems

Drought Tolerance

High Nitrogen Use Efficiency

Rye Cover Crop Reduced Corn Yield

Waseca, MN (avg. of 16 hybrids)



Hybrids Differed in Tolerance to Stress

Waseca, MN – 2010

Hybrid	Rye cover crop?	
	No	Yes
	----- bushels/acre -----	
DK-547 (1986)	163	110
DK-471 (1993)	166	130
DKC36-34 (VT3)	153	124
DKC36-37 (RR2)	160	123
DKC38-89 (VT3)	148	135
DKC38-92 (RR2)	154	125
DKC43-27 (VT3)	180	144
DKC43-30 (RR2)	179	129
DKC46-05 (RR2)	150	133
DKC46-07 (SS)	167	118
DKC48-37 (VT3)	173	130
DKC48-40 (RR2)	190	137
DKC50-47 (RR2)	174	147
DKC52-59 (VT3)	182	159
DKC52-62 (RR2)	172	128
DKC53-45 (SS)	157	138

*Green = highest yielding group ($P \leq 0.10$).

*Red = lowest yielding group ($P \leq 0.10$).

Waseca, MN – 2011

Hybrid	Rye cover crop?	
	No	Yes
	----- bushels/acre -----	
DKC36-34 (VT3)	185	158
DKC36-37 (RR2)	185	156
DKC38-89 (VT3)	192	182
DKC38-92 (RR2)	196	162
DKC43-27 (VT3)	199	158
DKC43-30 (RR2)	206	180
DKC44-92 (RR2)	205	155
DKC46-61 (SS)	205	160
DKC48-37 (VT3)	196	156
DKC48-40 (RR2)	202	186
DKC48-46 (RR2/YGPL)	201	159
DKC48-53 (RR2/YGCB)	192	170
DKC50-47 (RR2)	218	197
DKC52-59 (VT3)	212	173
DKC52-62 (RR2)	205	173
DKC53-45 (SS)	199	154

Breeding Winter Annual Cover Crops for Annual Cropping Systems

Vetch/Legume for corn

Winter annual grasses for soybean

Short season cover crops/seed

Seed Treatments

Cover crop seed treatments that enhance establishment of cover crops

Crop seed treatments that protect crop seed in cover crop systems